THE TEACHING OF PATIENT EDUCATION CONCEPTS ON THERAPEUTIC COMPLIANCE TO MEDICAL STUDENTS*

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IN medical care, compliance can be defined as the extent to which individuals follow the advice of health professionals. For several reasons, compliance may be the single most important phenomenon in modern medical therapeutics. First, over the last few decades many treatments have been developed that permit the efficacious management of disease while patients remain ambulatory and able to carry on with their usual daily work and activities. Second, and unfortunately, most of the potential value of these self-administered treatments is dissipated by low patient compliance with them. Third, during the last 10 years a number of well designed randomized control trials of compliance enhancing strategies have been executed and have demonstrated the value of some of these strategies while showing the ineffectiveness of others. Thus, with the optimum prescription of efficacious treatments and the application of effective compliance interventions, a large and increasing number of medical disorders could be controlled.

Sadly, medical practitioners have been slow to adopt useful compliance improving maneuvers and, as a consequence, there is a large gap between the demonstrated efficacy of ambulatory medical treatments in the somewhat pristine circumstances of clinical research and the rough and ready circumstances of usual practice.

The main tool at our disposal to narrow this gap is the education of health professionals in the principles of practical management of patient compliance. Since most of the procedures of established value in the improvement of compliance fall under the umbrella of patient education and since the pur-

*Presented as part of a *Conference on The Role of Academic Medicine in Patient Education* held by the Committee on Medicine in Society in cooperation with the Committee on Medical Education of the New York Academy of Medicine at the Tarrytown Conference Center, Tarrytown, N.Y., June 6 and 7, 1983.

This conference was supported by a grant from Pfizer Pharmaceuticals.

pose of this symposium is to discuss the ways and means of introducing and reinforcing patient education concepts in the curricula of medical schools, it seems most propitious to include the problems of dissemination and application suffered by compliance knowledge in this discussion.

The Magnitude of the Compliance Problem

Under usual conditions of ambulatory care, up to 50% of patients fail to follow through on referral advice, 75% fail to keep scheduled appointments for needed follow-up care, and more than 50% may drop out of care entirely within one year of beginning it for such chronic disorders as hypertension, tuberculosis, and the psychotic disorders; and about a third of those who continue in care fail to take enough medication to achieve the benefit of the treatment they have been prescribed.[1,2] The impact that noncompliance can have on the effectiveness of care is amply illustrated in the case of chlorthalidone and hypertension. In a tightly controlled pharmacologic trial of chlorthalidone, in which highly compliant subjects were recruited and followed closely, the correlation between the dose of this medication and the drop in patient's diastolic blood pressures was 0.63, a strong and highly statistically significant relationship.[3] However, in studies that we have conducted in Hamilton, Ontario, in which we have referred hypertensive individuals from screening to their own family physicians, the correlation between the dose of chlorthalidone and diastolic blood pressure several months after referral was a low and statistically insignificant 0.11. When the dose of medication prescribed was multiplied by the compliance of these patients, to determine the amount of medication actually consumed, the correlation rose to a statistically significant and much more robust 0.28. Thus, in a community setting the benefit of this potent antihypertensive agent was almost completely undermined, and the lion's share of the blame can be placed on the difficulties that patients have in following even simple drug regimens. This predicament is particularly tragic when one considers the availability of practical methods of improving compliance.

This paper will focus on formulation of a curriculum for teaching medical students how to manage patient compliance by applying patient education techniques. The term "educational" will be used in its broadest sense to include both information exchange from health care providers to patients and more behaviorally oriented tactics, such as cueing, modelling, and reinforcement. In concentrating on educational techniques it is recognized that not all effective methods of enhancing compliance are educational in nature

and thus that this review is incomplete from the perspective of compliance, though hopefully complete with respect to the educational approaches that are worthwhile. Finally, because the author's personal interest is primarily in compliance with prescribed medications, the review is further delimited to screening, referral, appointment, and treatment compliance for disorders for which medications are commonly prescribed.

A Basic Curriculum on Compliance

Before one can describe how one might improve the teaching of compliance in medical schools, it is essential to determine and delineate the facts about compliance that should be taught. Furthermore, in view of the very real problems faced in medical education of too many facts to be learned in too short a time, it is important that any information on compliance that is proposed for general integration into medical teaching be justified in terms of scientific credibility as well as clinical utility. With these precepts in mind, the literature on strategies for improving patient compliance by educational means has been reviewed by selecting and describing only those articles that met all of the following standards: report of an educational intervention to improve compliance with the screening, referral, or treatment of individuals with illnesses for which medications formed part of a recommended regimen; at least one measure of compliance; at least one measure of treatment outcome; a randomly allocated comparison group that did not receive the compliance intervention; sufficient data to permit the reader to verify statistical analysis; and if no statistically significant effect on compliance was found, at least 50 subjects in each study group, to reduce the likelihood of "false negative" results.

These criteria serve as a filter that will permit the extraction from the literature on compliance of the best studies that have reported relevant endpoints (compliance and treatment outcomes) for the topic (educational interventions to improve compliance) and among the subjects selected for this review (individuals with disorders for which medications would usually be indicated) in a scientifically acceptable fashion (validly formed control groups, statistical analysis, protection against "false negative" results). From a scientific perspective, these standards are as high as one might require for the introduction of a new drug into medical practice. This is appropriate because compliance is only a means to improve response to prescribed, efficacious treatments, and is not an important end in its own right. Although not the subject of this paper, it would seem worthwhile to me to adopt similar stan-

dards for the introduction of any material on patient education in general into medical practice or medical education. Studies that met the criteria outlined above are described briefly below. A more detailed analysis appears elsewhere.[4]

Improving referral follow-through. Only one study of an educational intervention met the selection criteria set out above. Hoehn-Saric et al.[6] were able to improve both referral success and treatment benefit among patients referred for psychiatric care by counselling patients on what to expect and how to get the most from therapy.

Although it is perhaps difficult to justify a curricular modification on the basis of just a single study, this study has been well designed and executed and merits inclusion in the teaching in medical schools, particularly in those aspects that relate to the management of psychiatric patients.

Improving attendance at appointments. To my knowledge, no acceptable studies have tested the value of educational interventions for improving attendance at appointments while simultaneously assessing the impact of such maneuvers on treatment outcome. This is an extremely important omission in our knowledge about compliance and the influence of patient education strategies on it because dropping out of care is a common form of noncompliance and it frequently results in cessation of all treatment.

A small number of studies met all the review criteria save for documentation of the effect of the intervention on treatment outcome. These studies evaluated the effectiveness of telephone[7,8] or mailed[7,8,9] reminders and reported a 15 to 20% (absolute) increase in attendance among those who received reminders, with no difference between telephone and mail reminders. None of the studies took a careful look at the effect of reminders over time, but Gates and Colburn[8] provided preliminary data that the effect wears off as early as the second appointment for which a patient receives a reminder and Morse et al.,[10] in a controlled trial, found no reduction in appointment keeping when mailed reminders were discontinued at a pediatric clinic. The quality and consistency of the evidence on appointment keeping interventions does not seem to warrant its inclusion in a medical school curriculum on patient education and compliance. This is an important area for future research.

Improving compliance with short-term medical regimens. Only one study met all the review criteria. Colcher and Bass[11] found significant improvements in both compliance and therapeutic outcome from careful instruction from the therapist concerning the need to take all the tablets prescribed for a 10 day course of penicillin for streptococcal pharingitis. In fact, this ap-

proach was as successful therapeutically as giving patients a long-acting intramuscular injection of penicillin.

This well designed study is consistent with other studies that have not assessed treatment outcome but have shown similar effects on compliance of either written[12,13] and/or verbal[14] instructions. It appears from these studies that it is not necessary to convey an elaborate explanation of the illness and its therapy: It suffices to provide a simple but clear statement to the effect that the medication is to be taken in the schedule prescribed until the full course of treatment has been completed. The evidence on the value of patient instruction to enhance short-term medication compliance is sufficiently strong that all medical students should be exposed to it and tested on it.

Improving compliance with long-term medical regimens. Studies contributing to this section of the review had to meet all the criteria previously stated plus an additional one: the follow-up period must have extended for at least six months to permit assessment of the duration of any intervention effect.

Studies that tested an educational intervention and found no benefit are summarised in Table I. These studies tested information exchange procedures, such as pamphlets[15] and programmed instruction,[16] self-monitoring,[17,18] counselling by a health educator[19] or nurse,[18] home visits,[17] tangible rewards for higher compliance,[18] and peer group discussion.[18] In comparing these unsuccessful interventions with the successful ones that follow, the key distinguishing feature seems to be that the failed approaches are all unimodal in nature.

It is important to incorporate the results of these studies into the teaching of medical students because they provide sound evidence about the inadequacy of procedures that practicing physicians usually employ when attempting to gain compliance with long-term regimens.[20]

It is also important to point out that it would be logically incorrect to conclude from these studies that instruction of patients is unnecessary to gain patient cooperation. Aside from the fact that instruction was often a part of the more helpful interventions that follow, it is clearly true that patients must be well informed about certain aspects of the treatment including when to take it, what to do if certain adverse effects occur, and what to do if the prescription runs out. Furthermore, instructions do have at least a short-term effect on compliance, as was shown in the studies reviewed earlier.

As will also be shown below, treatment at the worksite and self-monitoring have been part of successful multifaceted methods of improving compliance.

Turning now to the procedures that have improved compliance in clini-

TABLE I. RANDOMIZED TRIALS OF STRATEGIES THAT HAVE FAILED TO IMPROVE COMPLIANCE WITH LONG-TERM MEDICAL REGIMENS

Citation	*Strategy*	*Compliance measure*	*Effect on compliance**	*Effect on outcome†*
Swain & Steckel, 1981	Educational pamphlets	Dropouts	−28%	n.s.
Levine et al., 1979	Counselling by health educator	Interview Weight loss Attendance	n.s. +21% n.s.	n.s.
Sackett et al., 1975	Programmed teaching	Pill count	n.s.	n.s.
Johnson et al., 1978	Home visits	Pill count	n.s.	n.s.
	Self-monitoring	Pill count	n.s.	n.s.
Shepard et al., 1979	Self-monitoring Nurse counselling Tangible rewards Peer group discussion	Attendance Dropouts Interview	n.s. for both compliance and outcome for all 3 measures for all 4 study groups	

*Reported as n.s. (nonsignificant) if effect not statistically significant; for significant effects, figure derived by subtracting percentage of patients judged compliant in the control group from percentage compliant in intervention group.

†n.s.: No significant effect on therapeutic outcome.

cal trials, Table II displays the relevant investigations. It is perhaps contentious to label any of these interventions as strictly "educational" in nature, but educational strategies, particularly of a behavioral sort, play a prominent role in most of them.

The methods described in these studies are quite diverse and have been discussed elsewhere.[5] However, some common themes merit comment. First, three of the studies[21,22,26] formally included recall of nonattenders in their intervention strategy, and it is likely that all the other studies incorporated this procedure as well even though they did not declare it as part of the intervention they were testing. In view of the high dropout rate from chronic care, the complete lack of treatment that ensues, the infrequency with which private practitioners recall patients who miss appointments for needed followup care,[20] and the simplicity of the maneuver required to remedy the problem, contacting nonattenders is undoubtedly the single most important compliance intervention available. Although it may not be thought of as "educational," there is some evidence that once patients know they will be contacted if they fail to attend an appointment, they do not often require further reminding.[21,22]

Another common strategy in these studies is reinforcement of high compliance.[15,23,24,26] As a method of modifying or sustaining compliance, positive reinforcement of the patient's behavior by the practitioner is a powerful tool.

Group discussions provide another medium for enhancing compliance in

TABLE II. RANDOMIZED TRIALS OF STRATEGIES THAT HAVE IMPROVED COMPLIANCE WITH LONG-TERM MEDICAL REGIMENS

Citation	*Strategy*	*Compliance measure*	*Effect on compliance**
Feinstein et al., 1959	i.m. injection and retrieval of dropouts	Attendance/interview	+51%
Feinstein et al., 1968	i.m. injection and retrieval of dropouts	Attendance/interview	+58%
Haynes et al., 1976	Self-monitoring and cueing and positive reinforcement	Pill count	+21%
Levine et al., 1979	Alone and in combination: counselling, family support, group discussions	Interview/attendance	see text
Logan et al., 1979	Nurse management at worksite and cueing, self-monitoring, reinforcement	Interview plus pill count	+19%
Nessman et al., 1980	Self-monitoring and group discussion and self-management of drug protocol	Pill count Attendance	+19% +15%
Swain and Steckel, 1981	Contingency contracting and instruction pamphlets	Attendance	+28%
Takala et al., 1979	Written instruction and feedback and recalls to nonattenders	Attendance	+15%

*Figures derived by subtracting the percentage of patients judged compliant in the control group from the percentage compliant in the intervention group. All figures are statistically significant ($p<0.05$) and all compliant improvements were associated with statistically significant improvements in treatment benefit.

combination with other methods.[19,25] However, it would be difficult to organize group meetings in many if not most practice settings.

A strategy that has received only limited testing to date but that appears to hold some promise, at least when combined with other methods, is encouraging family support for the patient.[19] The attraction of this tactic is that, if successful, it places an external stimulus for reinforcement of compliance in the patient's immediate environment and, in the process, it may reduce the amount of input required from health care providers. This possibility merits further investigation, however, before it can be included as a selling point for this approach in teaching compliance concepts to medical students.

An additional point about long-term compliance requires emphasis: no compliance intervention to date has been shown to have effects that last long after its application and the best that patients and practitioners can hope for at present is to titrate the dose of compliance intervention to determine the minimum amount required to sustain an individual patient's compliance at an acceptable level.

As a final point that should be considered carefully in any teaching about patient compliance, there are circumstances in which it is not in the patient's

best interest to comply, whether because of intolerable side effects or simply for reasons best left to the patient to decide. Thus, patients should never be coerced into complying or denied the right to refuse treatment save in those situations determined by the law. However, most noncompliance occurs through default or neglect, not active refusal, and many patients will only realize the full benefits of modern treatments if they are assisted by practitioners to follow the prescribed treatment.

Special Problems in Integrating Compliance Concepts into Medical School Curricula

The scientific underpinnings for inclusion of methods of managing patient compliance in medical school curricula are strong and this is an important first step that should help in convincing medical curriculum planners not only that these methods should be incorporated into the teaching syllabus but what concepts should be taught. Indeed, few recent advances have greater potential for improving medical care than have those related to patient compliance.

However, the dissemination of any new knowledge is slow and imperfect and that related to compliance specifically (and patient education, in general) is particularly likely to be so for at least three reasons. In the first place, problems of patient compliance cut across all clinical disciplines and thus belong to none. This dilemma is not easily solved by creating a new discipline, such as "patient education," or assigning compliance to a rapidly developing discipline such as behavioral medicine or even to a traditional clinical discipline such as psychiatry. This is because compliance is not an end in and of itself but rather is a process variable best discussed in the context of a specific, tested, and demonstrably efficacious therapeutic regimen for which noncompliance is likely to interfere with the achievement of the intended treatment goal. Yet, it is certainly not reasonable, at the present time at least, to expect each and every discipline to teach or be able to teach patient compliance concepts vigorously or accurately. The second problem deterring the rapid and accurate translation of compliance management into medical school curricula is that it is "disembodied." It is relatively easy to introduce new knowledge such as the finding that beta-blockers reduce mortality when prescribed following nonfatal myocardial infarction.[27] However, even though compliance interventions would undoubtedly increase the life-saving impact of this treatment, these interventions cannot be so easily packaged (nor so loudly heralded) that practitioners and students can appreciate and make use of them. The third and perhaps even more distressing reason

that compliance concepts are difficult to integrate into medical school curricula is that noncompliance is largely a problem of ambulatory care but very little teaching of medical students and residents takes place in ambulatory settings. Although it is true that ambulatory care opportunities are increasing in many medical schools and in the general medical disciplines in particular, these outpatient clinical experiences seldom permit students to provide sufficient continuity of care that they are able to observe the occurrence of noncompliance, let alone its consequences.

Bearing these special problems in mind, we now turn to how one might incorporate compliance concepts into medical curricula in an effective manner.

Suggestions for Teaching Compliance Management

Letting evidence light the path again, two studies have demonstrated effective ways to convey a practical appreciation of compliance management. Barry Blackwell and his colleagues[28] gave undergraduate medical students a "prescription" for vitamin C and had them take it on a three times a day schedule for a one week period before a teaching conference on patient compliance. Predictably, the compliance of the students was far less than optimum. Students who participated in the study gave favorable reports of it as a learning experience.

The second study, by Thomas Inui and his colleagues,[29] took place in a general medical outpatient clinic and is unique in that it is the only study I am aware of that has demonstrated improvements in patient outcomes following an instructional intervention for house officers. The investigation involved a single tutorial session for staff physicians and residents on the management of compliance for hypertensive patients. The tutorials covered simple ways to detect low compliance and stressed the need to spend a few moments discussing compliance with patients at each visit, using the "Health Belief Model"[30] as the basis for interaction. Not only were the medication compliance and blood pressures of the patients of these physicians improved but this improvement was sustained at a recheck six months after the educational intervention had been completed. This is heartening news for both practitioners who must care for ambulatory patients and medical educators who are looking for a teaching model.

Both of these studies illustrate an important educational principle: the learning experience should resemble as closely as possible the actual circumstances in which the knowledge and skills are to be applied. In the case of under-

graduate students it may be difficult to provide sufficient responsibility for the ongoing care of ambulatory patients to permit actual management of compliance problems and the involvement of the student as a "patient" seems to be a salutary experience from which to explore the manifestations and ramifications of compliance. As for the postgraduate training period, it is difficult to imagine a more satisfying approach than the one devised and executed by Dr. Inui.

However, there are many medical schools and many ways in any medical school for students to escape without satisfactory ambulatory care training and, even in settings where there is sufficient opportunity for outpatient care, principles of compliance monitoring and enhancement may not be taught correctly or in sufficient depth to ensure that students will master the necessary skills to manage compliance successfully on their own.

This brings us back to the three special problems, alluded to earlier, that interfere with the rapid and accurate dissemination and application of compliance knowledge. The first of these was that compliance cuts across all clinical disciplines and therefore lacks a natural "home," given the fashion in which most medical school curricula are structured. I do not believe that there is a wholly satisfactory solution for this problem but would suggest that all clinical disciplines be encouraged to incorporate compliance into their teaching and examinations. At the same time, I feel that the acquisition of polished compliance skills should be emphasized most strongly by the primary care disciplines of family medicine, pediatrics, general internal medicine, and obstetrics, with the addition of psychiatry, since there is evidence that psychiatric patients are somewhat worse compliers than other patients.[31]

As for the disembodied nature of compliance knowledge, the best remedy for this is to demystify compliance as much as possible and describe the clinically useful facts about compliance in as succinct and practical a fashion as possible. It is hoped that the review above will provide the basis for much of the content for this practical formulation and the studies of Inui[29] and Blackwell[28] will serve as models of how this information can be taught effectively.

The final problem identified earlier was that ambulatory care experiences are not extensive enough in many medical schools for students to develop seasoned compliance skills. This situation is changing slowly for the better in most schools, a trend that we can perhaps help to accelerate by convincing curriculum planners in clinical disciplines that the compliance challenges

of ambulatory practice are far more important to the provision of high quality medical care than most skills taught in the hospital ward.

Conclusion

Low patient compliance is an extremely important problem in medical care that greatly diminishes the effectiveness of many useful treatments. Fortunately, there has been considerable progress in the last few years in understanding noncompliance, and strategies have been devised to overcome much of it. Unfortunately, useful methods of improving patient compliance, including those that have to do with patient education, have been slow to enter medical school curricula.

Remedies to improve the teaching of compliance management to undergraduate and postgraduate physicians can be derived, at least in part, from studies that have tested specific educational interventions, and these can be used as models for future curricular developments. In general, compliance principles should be taught in ambulatory care settings by primary care specialists, and students should be given an opportunity to practice the appropriate skills until they can demonstrate satisfactory competence in independant compliance management for those clinical disorders for which noncompliance interferes with the achievement of the therapeutic goal.

REFERENCES

1. Finnerty, F.A., Shaw, L.W., and Himmelsbach, C.K.: Hypertension in the inner city ii) detection and followup. *Circulation 47:* 76-78, 1973.
2. Sackett, D.L. and Snow, J.C.: The Magnitude of Compliance and Noncompliance. In: *Compliance in Health Care,* Haynes R.B., Taylor D.W., and Sackett D.L., editors. Baltimore, Johns Hopkins University Press, 1979, chapter 2.
3. Materson, B.J., Oster, J.R., Michael U.F., et al.: Dose response to chlorthalidone in patients with mild hypertension. *Clin. Pharmacol. Ther. 24:* 192-98, 1978.
4. Haynes, R.B.: Compliance and the Design and Interpretation of Clinical Trials. *Annual Meeting of the Society for Clinical Trials.* St. Louis, Missouri, April 1983.
5. Haynes, R.B.: Improving Patient Compliance: An Empirical Review. In: *Adherence, Compliance and Generalization in Behavioral Medicine,* Stuart, R.B., editor. New York, Brunner/Mazel, 1982.
6. Hoehn-Saric, R., Frank, J., Imber, S., et al.: Systematic preparation of patients for psychotherapy. i) effects on therapy behavior and outcome. *J. Psychiatr. Res. 2:* 267-81, 1964.
7. Shepard, D.S. and Moseley, T.A.: Mailed versus telephoned appointment reminders to reduce broken appointments in a hospital outpatient department. *Med. Care 14:* 268-73, 1976.
8. Gates, S.J. and Colborn, D.K.: Lowering appointment failures in a neighborhood health centre. *Med. Care 14:* 263-67, 1976.
9. Meller, W. and Anderson, A.: Medical compliance, the effect of appointment

reminders on keeping appointments in a core city pediatric outpatient department. *Minn. Med. 59:* 625-26, 1976.
10. Morse, D.L., Coulter, M.P., Nazarian, L.F., and Napodano, R.J.: Warning effectiveness of mained reminders on reducing broken appointments. *Pediatrics 68:* 846-49, 1981.
11. Colcher, I.S. and Bass, J.W.: Penicillin treatment of streptococcal pharyngitis: a comparison of schedules and role of specific counselling. *J.A.M.A. 222:* 657-59, 1972.
12. Sharpe, T.R. and Mikeal, R.L.: Patient compliance with antibiotic regimens. *Am. J. Hosp. Pharm. 31:* 479-84, 1974.
13. Linkewich, J.A., Catalano, R.B., and Flack, H.L.: The effect of packaging and instruction on outpatient compliance with medication regimens. *Drug Intell. Clin. Pharm. 8:* 10-15, 1974.
14. Dickey, F.F., Mattar, M.E., and Chudzik G.M.: Pharmacist counseling increases drug regimen compliance. *Hospitals 49:* 85-88, 1975.
15. Swain, M.A. and Steckel S.B.: Influencing adherence among hypertensives. *Res. Nurs. Health 4:* 213-22, 1981.
16. Sackett, D.L., Haynes, R.B., Gibson, E.S., et al.: Randomized clinical trial of strategies for improving medication compliance in primary hypertension. *Lancet 1:* 1205-07, 1975.
17. Johnson, A.L., Taylor, D.W., Sackett, D.L., et al.: Self-recording of blood pressure in the management of hypertension. *Canad. Med. Assoc. J. 119:* 1034-39, 1978.
18. Shepard, D.S., Foster, S.B., Stason, W.B., et al.: Cost-effectiveness of strategies to improve compliance with antihypertensive therapy. *Prev. Med. 8:* 229, 1979.
19. Levine, D.M., Green, L.W., Deeds, S.G., et al.: Health education for hypertensive patients. *J.A.M.A. 241:* 1700-03, 1979.
20. Logan, A.G.: *Investigation of Toronto General Practitioners' Treatment of Patients with Hypertension.* Toronto, Canadian Facts, 1978.
21. Feinstein, A.R., Wood, H.F., Epstein, J.A., et al.: A controlled study of three methods of prophylaxis against streptococcal infection in a population of rheumatic children. ii) Results of the first three years of the study, including methods for evaluating the maintenance of oral prophylaxis. *N. Engl. J. Med. 260:* 697-702, 1959.
22. Feinstein, A.R., Spagnuolo, M., Jonas S., Kloth, H., et al.: Prophylaxis of recurrent rheumatic fever. *J.A.M.A. 206:* 565-68, 1968.
23. Haynes, R.B., Sackett, D.L., Gibson, E.S., et al.: Improvement of medication compliance in uncontrolled hypertension. *Lancet 1:* 1265-68, 1976.
24. Logan, A.G., Milne, B.J., Achber, C., et al.: Worksite treatment of hypertension by specially trained nurses: a controlled trial. *Lancet 2:* 1175-78, 1980.
25. Nessman, D.G., Carnahan, J.E., and Nugent, C.A.: Improving compliance with therapeutic regimens in hypertensive patients in a community health center. *Circulation 59:* 540-43, 1979.
27. The Norwegian Multicentre Study Group: Timolol-induced reduction in mortality and reinfarction in patients surviving myocardial infarction. *N. Engl. J. Med. 304:* 801-07, 1981.
28. Blackwell, B., Griffin, B., Magill, M., and Bencze, R.: Teaching medical students about treatment compliance. *J. Med. Educ. 53:* 672-75, 1978.
29. Inui, T., Yourtee, E., and Williamson, J.: Improved outcomes in hypertension after physician tutorials. *Ann. Intern. Med. 84:* 646-51, 1976.
30. Becker, M.H., Maiman, L.A., Kirscht, J.P., et al.: Patient Perceptions and Compliance: Recent Studies of the Health Belief Model. In: *Compliance in Health Care,* Haynes, R.B., Taylor, D.W., and Sackett D.L., editors. Baltimore, Johns Hopkins University Press, 1979, chapter 6.
31. Haynes, R.B.: Determinants of Compliance: the Disease and the Mechanics of Treatment. In: *Compliance in Health Care,* Haynes R.B., Taylor D.W., Sackett D.L., editors. Baltimore, Johns Hopkins University Press. 1979, chapter 4.